**Lesson Plan**

**“Climate Change and Polar Bears”**

(Related to my cross-curricular unit about global warming and change)

**Teacher Candidate:** Diane Camejo **Grade Level:**  3 **Date of lesson:** October 2011

**Content Standards:** State the unit goal and identify one or two primary local, state **or** national curricular standards to which your lesson aligns. What key knowledge and skills will students be able to demonstrate as a result of your instruction?

Goal: The goal of this lesson is to encourage students to develop an understanding of the effects that global warming has on polar bears’ habitat.

DoDEA Standards for 3rd Grade Science:

**3Sb.4:** Explain how changes in the habitats of plants and animals affect their survival.

DoDEA Standards for 3rd Grade Math:

**3.M.5b:** translate information from one data representation to a graph or table, e.g., frequency table, bar graph, picture graph, line plot;

**3.M.5d:** organize and graphically display data using categories and intervals;

Students will be able to identify two key global warming factors that affect the polar bears’ habitat; increased open water areas and a shortened hunting season. Through participating in the activity students will find out how these factors change the polar bears’ habitat and their ability to survive. Students will be able to convert their findings that were recorded in their data chart and convert them into a double line graph.

**Learner Background:** Describe the students’ prior knowledge or skill related to the learning objective(s) and the content of this lesson. How did the students’ previous performance in this content area or skill impact your planning for this lesson?

Students have demonstrated their ability to follow directions and safety procedures during lessons plans that involve physical activity. This was demonstrated during a similar movement lesson about sea turtles’ struggles for survival. Students have also recently completed a unit about where they made their survey findings into various types of graphs.

**Student Learning Objective(s):** Identify specific and measurable learning objectives for this lesson.

Students will complete a data chart that will record the statistics and happenings of the game. Students will then use this data chart to answer discussion questions about how limiting factors such as melting ice change the polar bear’s habitat and affect their survival. Students will then convert their data chart into a multiple line graph display.

**Assessment:** How will you ask students to demonstrate mastery of the student learning objective(s)? Attach a copy of any assessment materials you will use, along with assessment criteria.

Students will be assessed based on their completion of the student data sheet accompanying this lesson and on their participation in class discussions after the activity game. Students will also be assessed based on their conversion of their data sheet into a multiple line graph.

**Materials/Resources:** List the materials you will use in each learning activity including any technological resources.

Data Chart for each student fill-out throughout the game(see attached)

Pens/pencils and something to write on for each student

Discussion Questions for the teacher (see attached)

Outdoor field or gym

10 “polar bear food tokens” (pieces of cut-out cardboard or beans)

Colored vests or T-shirts (to identify each student as either a polar bear or a seal)

Cones to set the boundaries of the game

Hula hoops to mark the safety zones for the seals

**Teaching Model/Strategy**

Accurately names model/strategy; Explains **WHY** this model/strategy is chosen for these learners; Explains **how** model/strategy lends itself to learning this content, these skills and/or dispositions.

This lesson will utilize the guided discovery approach as students are introduced to the factors that inhibit the polar bears environment. This teaching model will allow the students to discover through the game how these factors change the polar bears habitat.

**Learning Activities:**

**Initiation:** Briefly describe how you will initiate the lesson. (Set expectations for learning; articulates to learners: what they will be doing and learning in this lesson, how they will demonstrate learning and why this is important)

Start the lesson by asking the students if they have ever seen a polar bear or if they have ever seen pictures of a polar bear. Now ask them to picture in their minds what a polar bear looks like. Have the students to write a letter to someone in future describing a polar bear for they may not exist in the future. (Through the following activity students will discover why polar bears may become extinct.)

**Lesson Development:** Describe how you will develop the lesson, what you will do to model or guide practice, what learning activities students will be engaged in order to gain the key knowledge and skills identified in the student learning objective(s). Identify the instructional grouping (whole class, small groups, pairs, individuals) you will use in each phase of instruction.

1. Identify students as either polar bears or ringed seals. About two thirds of the students can be seals and one third can be polar bears. Polar bears can wear a colored T-shirt or gym vest to identify themselves to the other players.
2. Each seal is given 10 food tokens to represent the seals caught by the polar bears.
3. In a gymnasium or outdoor field, use the traffic cones to identify boundaries.
4. Place four hula-hoops in the open area. The hula-hoops represent areas of open water that are temporary safety zones for the seals.
5. Record the number of seals and polar bears at the beginning and end of each round on the data chart.
6. Begin the game with all the seals starting at one end of the playing field and all the polar bears scattered around the playing field. The seals will try to run to the other end of the playing field without being tagged by the polar bears. The seals can use hula-hoops as temporary safety zones from the polar bears for a maximum of five seconds before they need to move on. When a seal is tagged, they must give one of their tokens to the bear. A seal must not be tagged twice in a row by the same bear. Once a seal runs out of tokens, they are considered to have lost their life and they must move over to the side of the playing field. After all the living seals have made their way to the other end of the playing field, the leader signals for the seals to run back to the other end using a whistle blast. One round of the game runs six lengths of the gym or field. That equals one season of hunting for the polar bears.
7. At the end of a round, the polar bears are to count the number of tokens collected. In order for a polar bear to survive the season, at least four tokens must have been collected. Deceased polar bears become seals during the next round. Polar bears that collect seven or more tokens have found enough food to reproduce. Reproducing bears select one of the dead seals (or a live seal if there are no dead seals to be had) to be their cub. The cubs will not be able to hunt during their first two seasons. They will have to follow close behind their mother and hope that enough seals are caught for them both to survive. A mother will need to catch a total of six tokens to ensure that she and her cub survive the season. Record the number of polar bears and seals that survived as well as the number of cubs born at the end of each round or season.
8. At the beginning of the each round, replenish the seals’ tokens to a total of ten tokens by collecting the tokens from the polar bears. All students get back in the game and are involved at the beginning of each round.
9. Repeat the game again as played before. Remind the cub polar bears that they are unable to catch seals and must only run behind their mother polar bear. At the end of the round, the polar bears count to see if they have collected enough tokens to survive – at least four for lone polar bears and six for both a mother polar bear and her cub to survive. If a polar bear has collected less than six tokens but has four or five, the cub has starved and will be returned to the seal population for the next round. If the polar bear has collected less than four tokens, then neither the mother nor the cub has survived. Once again, record how many polar bears, cubs, and seals that have survived. Polar bears that did not have a cub during this round will get a cub if they have seven or more tokens, just like in the first round.
10. In the next round, students are introduced to the limiting factors that are a result of climate change/global warming. Two changes can now be applied to the game:
    1. Increase the number of open water safety zones for the seals by increasing the number of hula-hoops on the playing field. Try adding three more hula-hoops to the playing area.
    2. Shorten the polar bears’ length of hunting season by reducing the number of times the seals have to run back and forth from six to four.
11. Continue playing the game by increasing the number of hula-hoops and reducing the number of cycles for each season. When recording the data, be sure to also record what changes have occurred in the simulated ecosystem (increased open water, shortened hunting season). Since these changes will result in poor hunting for the polar bears, lower rates of polar bear reproduction and decreases in survival rates for the bears. The game may be played until almost all the bears have died to show how climate change can lead to extinction.

**Closure:** Briefly describe how you will close the lesson and help students understand the purpose of the lesson. (Interact with learners to elicit evidence of student understanding of purpose(s) for learning and mastery of objectives)

1. Return to the class and analyze the data collected during the game. Hold a discussion about the students’ findings. Use the attached Questions for Discussion (see attached) for discussion topics.
2. **Math Component:** A comparison of seal and polar bear populations can be made by graphing the data of the number of seals and polar bears during each round. Using a multiple line graph the students can see how populations vary. Indicate events, such as shorter rounds or the addition of hula-hoops, in order to assist in the analysis of the results.

**Individuals Needing Differentiated Instruction:** Describe 1 to 3 students with identified instructional needs. (These students may be special or general education students and need not be the same students for each lesson. Students may represent a range of ability and/or achievement levels.)

|  |  |  |
| --- | --- | --- |
| Student Name | 1. What is the student’s identified instructional need? 2. What evidence do you have that this is an instructional need? | Describe strategy for differentiating instruction **in this lesson** to meet this need. |
| Jessica | 1.) Jessica has been medically diagnosed by her pediatrician as having dysgraphia and this is included in her IEP.  2.) Jessica has trouble putting her thoughts on paper. | 1.) For this activity, Jessica will be paired with a partner. They will work together to make the data sheet and double line graph. Jessica will still be able to participate in the activity and closing discussions. |
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**Reflection on Practice:**

**Student Achievement:**

Specifically analyzes student learning ***for each SLO***. *What differences do you notice in the performance of individual students?* Note needs or opportunities for re-teaching or enrichment for specific learners.

N/A

**Teacher Efficacy:** (Evaluation and Assessment of *one’s own teaching*): Examines/explains impact of personal teaching practice by responding to following:

1. What worked well and why? N/A
2. What did not work well and why? N/A
3. What actions will be taken now which are: N/A
4. Briefly describes ONE *reasonable* ***alternative approach*** that could be used to achieve these same SLOs? N/A

**“Bearly” Any Ice Data Chart**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | # of Rounds in Year | # of Hula Hoops | # of Adult Polar Bears at Beginning of Round | # of Surviving Adult Polar Bears | # of Cubs at beginning of round | # of Surviving Cubs | # of Cubs Born | # of Seals at Beginning of Round | # of Seals at End of Round |
| 1 |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |  |
| 11 |  |  |  |  |  |  |  |  |  |
| 12 |  |  |  |  |  |  |  |  |  |
| 13 |  |  |  |  |  |  |  |  |  |
| 14 |  |  |  |  |  |  |  |  |  |

**“Bearly” Any Ice – Discussion Questions**

1. How did the length of each round affect the polar bears’ chances of catching enough seals to survive?  
     
   **Answer:** The shorter the round, the more difficult it was to catch the number of seals required.
2. What change in the ecosystem does a shorter round represent?  
     
   **Answer:** The shorter round is equivalent to a shorter season of annual ice. This shorter season reduces the time for polar bears to acquire the food they need for survival.
3. How did the number of hula-hoops affect the polar bears’ chances to catch the required amount of seals in order to survive?  
     
   **Answer:** The more hula-hoops, the more safety zones become available for the seals (i.e. open water), increasing the seals’ chance of survival and increasing the difficulty for the polar bears to find the food needed for survival.
4. What change in the ecosystem did the increased number of hula-hoops represent?  
     
   **Answer**: More hula-hoops reflect greater amounts of open water for the seals to take protection from the polar bears.
5. If the sea ice continues to vanish, what may be the ultimate fate for the polar bear?  
     
   **Answer:** The polar bear could become extinct.
6. Could the polar bears adapt in order to survive?  
     
   **Answer:** The bears could find other sources of food or methods of hunting. However, adaptation usually takes a very long time and the changes brought on by global warming have been relatively fast compared with rates of adaptation.

Resource: <http://www.climatechangenorth.ca/section-LP/LP_10_HI_M_peter_SH.html#SH01>

This lesson was adapted from Project Wild, Canadian Wildlife Federation, Ottawa, 1999.